

METHOD AND APPARATUS FOR MODIFYING RELOCATABLE
OBJECT CODE FILES AND MONITORING PROGRAMS

ABSTRACT OF THE DISCLOSURE

5 An object code expansion program inserts new
instructions and data between preexisting instructions and data
of an object code file; offsets are modified to reflect new
positions of the preexisting instructions and data. For each
item of preexisting object code (instructions or data), the
10 following steps are performed: making a new code block
comprising any desired new instructions and the item, and
storing it as new object code; tracking the location of the
item and the new code block within the new object code; and
tracking items that contain inter-item offsets. Then, each
15 inter-item offset is updated using the new location of the item
or new code block, as required. Finally, offsets in symbol
tables and relocation structures are updated with the new
location of the item.

 This expansion program is used to add instructions to
20 object code files of a second program, to monitor substantially
all of the memory accesses of the second program. The added
instructions establish and maintain a memory status array with
entries for memory locations that are validly accessible by the
second program; entries indicate the status of corresponding
25 memory locations. The memory status array is used to check for
the errors of writing to unallocated memory and reading from
unallocated or uninitialized memory. Also, the data section of
the object code files are expanded with extra dummy entries to
aid in the detection of array bounds violations and similar
30 data errors. Furthermore, watchpoints can be established for
more comprehensive monitoring.